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2014 AArk Seed Grants

Three new *ex situ* rescue projects were all awarded Amphibian Ark Seed Grants in May, two in Madagascar and the other in Argentina. Our \$5,000 Seed Grants are designed to fund small start-up rescue projects for amphibian species that cannot currently be saved in the wild, and since 2009, 15 AArk Seed Grants have been awarded to projects in 12 countries. To be eligible for an AArk Seed Grant, projects are required to:

- focus on species whose threats cannot be mitigated in nature in time to prevent their extinction and which therefore require *ex situ* intervention to persist
- work with species within their native range country
- involve range-country biologists
- adhere to recommended biosecurity standards for *ex situ* programs
- link *ex situ* programs to *in situ* conservation
- involve partnerships to maximize the likelihood of the program's long-term sustainability.

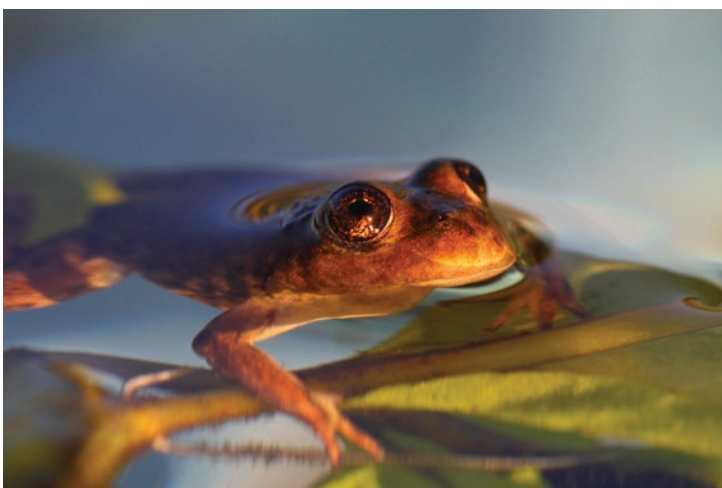
More information about our Seed Grants can be found on our web site, www.amphibianark.org/aark-seed-grant/.

The first project to have received a grant this year is titled “**Developing a captive breeding facility for Malagasy amphibians in peril at Parc Ivoloïna, Toamasina, Madagascar**”, and is being managed by Maya Moore, Program Manager from the Madagascar Fauna and Flora Group (MFG), Dr. Karen Freeman, Research Director, from MFG and Bernard Iambana Richardson, National Director of Parc Zoologique Ivoloïna. With chytrid fungus now confirmed to have arrived in Madagascar, it is crucial that additional resources be applied to local amphibian conservation projects, to try to prevent a catastrophic decline in Madagascar's amphibian biodiversity.

The MFG is a consortium of zoos, botanical gardens and aquariums working to conserve biodiversity in Madagascar, and it operates a small zoological park (Parc Zoologique Ivoloïna) 12 km from the port city of Toamasina on the east coast of Madagascar. In 2013, MFG received funding from Durrell Wildlife Conservation Trust and the Unione Italiana degli Zoo e degli Acquari to construct Madagascar's second Amphibian Conservation Center. AArk previously awarded a \$5,000 Seed Grant to Association Mitsinjo, in Andasibe, Madagascar, where the first captive breeding center for the country was established.

The funding from this grant will allow the MFG to further develop and expand its captive breeding facility for threatened Malagasy amphibians. Funds will be used to purchase supplies for the center, including a water treatment system, as part of enhanced biosecurity measures, materials for live food production, and field equipment for amphibian inventories.

Amphibian species will be chosen based on their conservation status, potential for successful management in captivity, and high priority using AArk's Conservation Needs Assessment process. The assessment is currently being undertaken by Devin Edmonds from Association Mitsinjo, Franco Andreone from the Amphibian Specialist Group Madagascar and Museo Regionale di Scienze Naturali, Torino, and Karen Freeman.



The Somuncura frog (*Pleurodema somuncurensis*) is one of the species that will be housed in the first amphibian rescue centre in Argentina, once it is established. Photo: D. Podestá.



The new amphibian breeding facility at Parc Zoologique Ivoloïna. Funding from the AArk Seed Grant will be used to purchase supplies for the center, including a water treatment system, as part of enhanced biosecurity measures. Photo: Maya Moore.

The second grant awarded this year is for the project “**The first amphibian rescue center in Argentina: an *ex situ* conservation program for *Telmatobius stephani* and *T. pisanoi***”, managed by Federico Kacolaris and Jorge Williams from the Herpetological Laboratory at La Plata University, Buenos Aires, in Argentina. Both of these species of *Telmatobius* are rare, with areas of occupancy of less than 500 km². Individuals are only known from four and seven localities respectively and both are facing a continuing decline in the extent and quality of their habitats. The main threats for these species are habitat loss, predation by exotic fish (trout), alteration of watersheds (the species are wholly aquatic) and human activities (agricultural and potential mining). Although some *in situ* activities are being developed, an *ex situ* complement is urgently needed in order to ensure the conservation of both species to ensure their long-lasting viability. This will be the first amphibian rescue centre in Argentina and because the center will be developed in a research facility at La Plata University, the future maintenance of the center is already ensured.

The necessary permits for the collection of founder animals have already been obtained, and the institutional infrastructure is

already in place. The funds from this grant will be used to buy additional equipment to improve biosecurity conditions, and to collect individuals to establish the first survival assurance colonies of both species. The project team also plans to interact with other amphibian conservation projects working in Argentina in order to plan the future establishment of colonies of other priority amphibian species such as *Rhinella achalensis*. The final goal is to provide animals for reintroduction to natural habitats.

Breeding colonies will provide healthy individuals to be reintroduced to their natural habitats. By working together with an *in situ* program aimed to alleviate or to avoid threats in the field, the *ex situ* program will be of key importance in order to ensure the existence of a higher number of individuals than the minimum viable population size for both species.

The final project to be awarded a grant this year is “**Construction of a breeding room at Centre ValBio for endangered frogs from Ranomafana National Park in south-east Madagascar**”. With the threat of chytrid fungus being recently confirmed in Malagasy frogs, a coordinated effort among the conservation communities to ensure a future for the 500+ amphibian species endemic to Madagascar is urgently required. In response to this threat, collaboration between Association Mitsinjo, Madagascar Flora and Fauna Group’s (MFG) Parc Ivoloina, Centre ValBio, the Institute for the Conservation of Tropical Environments (ICTE) and the Indigenous Forest Research Organization for Global Sustainability (iFrogs) will result in the creation of a new frog and live food breeding facility.

The facility will be located at Centre ValBio in the amphibian diversity hotspot of Ranomafana National Park in south-east Madagascar and will focus on *ex situ* rescue of the most endangered frog species from the surrounding areas. Initial breeding programs will involve Malagasy poison frogs (*Mantella* species) because their captive husbandry is well established. First, local Centre ValBio staff will be trained to work with the common Baron’s Mantella (*Mantella baroni*). This will allow a rapid response to establish a captive assurance colony of the IUCN Red Listed Endangered Bernhard’s Mantella (*Mantella bernhardi*) once capacities are developed. Founders will be collected from the three remaining sites where the species occurs in a coordinated effort to ensure its survival.

Seed funds from AArk will be used to purchase materials for building the frog and live food enclosures, transport the team to field sites for collection of arthropod feeders and founding populations of *Mantella* species, and training of Centre ValBio staff to run the frog and live food breeding facility.

Amphibian Ark is excited to be able to support all of these new projects, and we look forward to hearing of their progress over the coming months. The complete project descriptions for these three projects can be found on our web site, www.amphibianark.org/2014-seed-grant-winners/.



Baron’s Mantella (*Mantella baroni*) will be used as a surrogate species at the new amphibian breeding facility at Centre ValBio in Ranomafana National Park in Madagascar. Skills obtained from maintaining this species will then be used to establish assurance populations of more threatened species. Photo: Valerie C. Clark, www.ifrogs.net.



Second grade Go Green For Frogs team members at Tremont Elementary School have raised an amazing \$9,750 for the AArk since 2008. Photo: Tremont Elementary School.

Tremont Elementary School does it again!

Two amazing teachers Linda and Carolyn from Tremont Elementary School, just outside of Columbus, Ohio have been working with their various second grade students since 2008 on a project they call Go Green for Frogs (GGFF - <http://tremont.uaschools.org/pages/Tremont/News/GGFFproject>) and have been fundraising for the AArk. To-date, they have donated just over \$9,500, raised at various events including frog book read-a-thons, craft fairs, and designing and selling tote bags. Just recently, the kids had a salsa, chips and pickles sale, and they raised another \$250 which they are donating to the AArk!

Linda and Carolyn are two truly inspiring teachers, and along with their second grade students, are helping to make a big difference, not only through their fundraising efforts, but by teaching the students and their families about caring for the environment by saving water and using less paper towels when you wash your hands.

Thanks Tremont Elementary School - your efforts are outstanding!

Conservation education and community participation survey

Rachel E. Rommel, AArk Associate

In April 2014 Amphibian Ark sent out a Conservation Education and Community Participation Survey to get a better idea of current activities and training/resource needs related to public engagement in amphibian conservation programs. Information gathered will be used for potential creation of resources and inclusion of training by Amphibian Ark and our partners. It will also help in the identification of relevant funding opportunities and sources for partner needs. The survey was distributed to *ex situ* amphibian program managers and to the Amphibian Specialist Group Communications and Education Working Group. We encourage those who have not already filled out the survey to please do so by July 31, 2014. It is available in English (www.surveymonkey.com/s/LK3CZHF) and Spanish (www.surveymonkey.com/s/MNBT2J2).

To date, we have received 31 responses from amphibian conservation managers, representing 16 countries from 6 continents (Africa 16%, Asia 7%, Australia 6%, Europe 10%, North America 48%, South America 13%). Thirty-three different taxa were mentioned as focal species for programs, with many respondents working with multiple species in their regions. Species ranged in IUCN Red List status from Least Concern to Critically Endangered. These species exist primarily on a combination of public, private, and/or community governed lands inferring amphibian managers and their recovery partners interface with a diversity of stakeholders and public audiences. The three greatest threats reported for focal species (listed in order of frequency selected) are habitat loss, pollution/watershed quality and disease - followed by invasive species, overharvest, road mortality, climate change, etc.

The primary focus in amphibian conservation work was research and monitoring, followed by conservation education, and captive breeding (Figure 1). These individuals and/or their associated organizations are conducting a variety of public engagement programs which range from raising general amphibian awareness to highly participatory community programs such as citizen science and habitat restoration work (Table 1). A few also reported community incentive and wellness programs.

Seventy-nine percent of respondents report including these activities in their program budget, although not surprisingly, they noted the need for more funding for conservation education activities. Organizations allocate anywhere from 1-8 staff for these programs and those affiliated with zoos generally reported more individuals who implement these programs. In some cases, primary research biologists are the only ones available to conduct these programs. Most respondents report conducting activities in partnership with state, federal agencies, NGO's, local environmental organizations, schools, etc.

Fifty-two percent of respondents report they do not evaluate these programs, 33% do evaluate, and a final 15% were not sure. Those that conduct program evaluation elaborated on methods citing pre and post surveys, measurable targets, workshop evaluations, and number of people trained as examples of metrics. Long term evaluation was not noted in any of the examples.

Training needs

Table 2 shows selections for desired future training opportunities for communications, conservation education, and/or community participation programs.

Respondents also included several of their own ideas in open comments as to resource needs. The responses generally fall within the following categories:

1. Web site or clearinghouse with updated education funding/grant opportunities.
2. More use of technology (apps, citizen science, etc.).
3. Resource database including PowerPoint presentations, resources, guides.
4. Platform for practitioners to share ideas, successes, model programs.

Respondents selected "In person at my location", "In conjunction with another workshop or conference" and "Alternative training or materials via toolkits, guides" most frequently as a preferred setting for future training opportunities or resources.

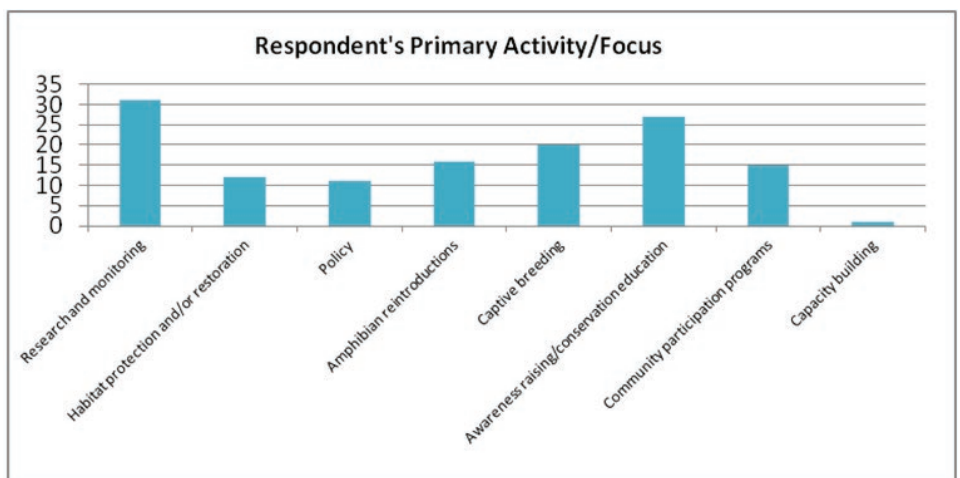


Figure 1 (above). Survey respondents' primary focus in amphibian conservation work.

Activity	# of times selected
General awareness raising (i.e. events, presentations, posters, social media)	26
Adult conservation education programs (i.e. teachers, landowners, target audience)	20
Youth conservation education programs	18
Opportunity for public to observe live focal species	18
Public exhibits and interpretive panels	17
Amphibian citizen science	12
Public workshops or capacity building	10
Other citizen science (birds, water quality, etc.)	7
Eco-tourism	6
Focus groups or interviews with target audiences	5
Community based natural resource management	5
Community wellness programs	4
Do not include activities	2

Table 1. Current activities conducted related to community engagement.

Discussion

Conservation education and community participation programs have an important role in the success and sustainability of amphibian recovery programs. Strategic communication with target audiences also has the potential to better inform our conservation activities, which can help lay the ground work for a more collaborative and effective approach.

Results of the survey indicate there is a need for access to more resources and training for general ideas for amphibian and environmental education and effective interpretation to raise awareness and cultivate positive attitudes. In some cases, programs may opt to not focus entirely on amphibians. For example, a focus on local resources or watershed health may have a more compelling connection with communities and livelihoods. Respondents have also requested opportunities for training and resources which promote public participation, such as citizen science, a promising tool for fostering ownership, and getting individuals involved in their own backyards. Behavior change and action-based conservation were also selected, indicating a need for training on methods which have the potential to identify and remove barriers, provide motivation and incentive, and move targeted audiences from awareness toward actual behaviors which may have positive impacts for species recovery (for example see Community Based Social Marketing, www.rug.nl/gmw/psychology/research/onderzoek_summerschool/firststep/content/papers/2.3.pdf). Last but not least, managers have indicated program management and evaluation as an area for needed resources and training. In lieu of limited time, funding, and staff, evaluation is critical to determine what and how information should be collected, how to best analyze that information to improve a program's value and quality for reaching our ultimate recovery objectives.

The good news? Most (if not all) of these resources are out there! While there is still room for improvement, there are many training programs and resources that would be of great help to amphibian practitioners in all of these areas. The truth is, we all have very little time to sort through all of the information out there. Sometimes, we may not even be sure of the resources we need to be looking for in the first place! Respondents have noted that a central location or clearinghouse for these resources, opportunities, and relevant grants would be very helpful. In addition, we need to find a way for practitioners to be able to regularly com-

Activity	# of times selected
General ideas for amphibian education	21
Effective interpretation (i.e. for graphics, informational materials, presentations)	18
Community program management and evaluation	17
Environmental education	16
Citizen science programs	15
General communication and networking skills	14
Social marketing/changing behavior	14
Youth activities and programs	13
Not interested in training on these topics	4

Table 2. Desired future training opportunities for communications, conservation education, and/or community participation programs.

municate with each other to share program ideas, successes, and challenges specific to these activities.

We will be looking for opportunities to partner with others to try to meet these needs in the future. In the interim, there are some good places to go for more information. The Communications, Education and Public Awareness (CEPA) Specialty Group of the IUCN (www.iucn.org/about/union/commissions/cec/cec_specialty_groups/cec_cepa_specialty_group/) have some resources that can be downloaded - many available in English, French, and Spanish. Need some amphibian specific feedback or support in communications and conservation education? You can reach out to the Amphibian Specialist Group Communications and Education Working Group (www.amphibians.org/science/communications-and-education/). If you are looking for evaluation resources, visit MEERA (My Environmental Education Evaluation Resource Assistant, <http://meera.snre.umich.edu/>) a resource site in partnership with the United States Environmental Protection Agency, the United States Forest Service, and the University of Michigan School of Natural Resources and Environment. There are also multiple resources available for wetland, amphibian education, and citizen science programs. If you have any requests for these resources, questions or comments about the survey, please shoot me an email at rachel@amphibianark.org.

2013 Amphibian Conservation – Highlights and Accomplishments report available

Shelly Grow, Director of Conservation Programs, AZA

The Association of Zoos and Aquariums' (AZA) 2013 Amphibian Conservation - Highlights and Accomplishments report is now available online (www.aza.org/amphibian-news/, or by using the direct link <http://bit.ly/2013Amphibian>). This 32-page report features an array of both domestic and international amphibian conservation programs in which AZA-accredited zoos and aquariums play an active role.

Included are articles from program leaders of AZA's amphibian Species Survival Plan® programs and individuals, as well as updates that were submitted through AZA's Annual Report on Conservation Science. Topics include updates on the SSP programs, citizen science efforts, reintroduction and head-starting initiatives, and research.



Promoting the progress of *ex situ* amphibian conservation programs online

Since 2008, Amphibian Ark has been following the progress and successes of *ex situ* programs for amphibian species that have either been assessed during an Amphibian Conservation Needs Assessment workshop (www.amphibianark.org/planning-workshops), or via a similar national assessment, as requiring urgent *ex situ* rescue or research. We follow progress via a series of key steps in the progression of successful amphibian conservation programs, as a way to document and promote the great work being undertaken by the *ex situ* amphibian conservation community. The list of programs currently being followed can be seen on the Progress of Programs page on our web site, www.amphibianark.org/progress-of-programs/. The list currently includes 122 programs, for 100 species, in 23 countries, and clicking on the species links on this page will display additional information and photos from each program.

Including program updates in this list not only promotes the successes of each program, but it shows that the *ex situ* community is making a difference to amphibian conservation, it provides a great way for others to learn from shared experiences, and it also provides an opportunity for program managers to seek support for any additional resources that they might need for their programs.

Earlier this year, an online application was launched (<http://progress.amphibianark.org>) which allows program managers to log in, review and update the information about their conservation programs, upload photos of their species and facilities, and identify additional resources that they might need to achieve their program goals. The updates are automatically reflected in the list of programs on our web site, and those that match our definition of model programs (www.amphibianark.org/model-programs.htm) are also featured in the list of model amphibian conservation programs.



All of these reports can be filtered by using the Search option, and sorted in various ways by clicking the up and down arrows to the right of each column header.

We'd like to encourage all managers of captive rescue, supplementation or research programs for threatened amphibians to include their program details in this list, so we can continue to show that the zoo, aquarium, museum and university community is facing the enormous challenge ahead of us, to help save the most threatened amphibian species from extinction.

If your program is not listed, or if you have not yet received a login to the system, please contact Kevin Johnson, kevinj@amphibianark.org.



Progress of the *Telmatobius culeus* program at Museo de Historia Natural Alcide d'Orbigny

Species	<i>Telmatobius culeus</i>	
Common Name(s)	Titicaca Water Frog	
Region where program is based	South America	
Country where program is based	Bolivia, Plurinational State of	
The authority that recommended this species for an <i>ex situ</i> program	['Amphibian Ark']	
Has a genetic analysis been performed on wild populations to define the target taxon, i.e., verify that single, viable Evolutionarily Significant Units (ESUs) that are managed as separate populations, are not confounded by cryptic species or polymorphisms?	Yes	
If the answer to ESU is No, then there should be an entry for the needs in AArk's Conservation Projects list.		
Name of the institution managing the <i>ex situ</i> population	Museo de Historia Natural Alcide d'Orbigny	
Year the program started	2008	

Looking for support for your amphibian program?

If you manage an *ex situ* amphibian rescue, supplementation or research program and your program could benefit from some additional support, either financially, or through training, advice etc. we can help you to find what you need. Simply fill in the information about your needs in the Program Resources section of your program's profile, and your needs will automatically be listed on our web site.

We've been able to help a number of amphibian conservation projects by partnering organizations looking to support valuable programs with appropriate programs that need a little extra support.

See www.amphibianark.org/programs-needing-support/.



Programs Needing Support

AArk works with many partners around the world, including organizations and projects that are currently seeking external support to help with their amphibian conservation projects. Assistance may be in the form of funding, support with specialized staff or training skills, volunteering or in-kind support by providing equipment and supplies.

The following programs are for species that have been assessed either globally or locally, for urgent captive programs to ensure their ultimate survival in the wild. You can read more about the conservation programs by clicking the Show Program icon on the right side of each program, or you can contact the program managers directly using the Contact email link, to find out more about how you can help.

These programs appreciate your support to help save threatened amphibians!

Programs Needing Support by Country (46 programs in total)							
Brazil							
Species	Organization	Contact	Category	Resources	Space	Staff	
<i>Scinax alcatraz</i>	Fundação Parque Zoológico de São Paulo	Cybele Lisboa	Rescue (CIAAV)	●	●	●	↔
Chile							
Species	Organization	Contact	Category	Resources	Space	Staff	
<i>Rhinoderma darwini</i>	Universidad de Concepción	Carlos Barrantes Doreoso	Ex situ research (CIAAV)	●	●	●	↔
Colombia							
Species	Organization	Contact	Category	Resources	Space	Staff	
<i>Phyllobates tembalá</i>	Fundación Zoológica de Cali - CREA	Camilo José Lombardo Andrade	Ex situ research (CIAAV)	●	●	●	↔
<i>Phyllobates tembalá</i>	Parque Explora	Alejandro Ramirez	Ex situ research (CIAAV)	●	●	●	↔
Cuba							
Species	Organization	Contact	Category	Resources	Space	Staff	
<i>Phyllodytes longirostris</i>	Luis Diaz		Rescue (CIAAV)	●	●	●	↔
Ecuador							
Species	Organization	Contact	Category	Resources	Space	Staff	
<i>Atelopus balios</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Rescue (CIAAV)	●	●	●	↔
<i>Atelopus cyanus</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Rescue (Other)	●	●	●	↔
<i>Atelopus elegans</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Ex situ research (Other)	●	●	●	↔
<i>Atelopus nanay</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Rescue (CIAAV)	●	●	●	↔
<i>Anolis sp. (spemannae pulchrae complex)</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Rescue (Other)	●	●	●	↔
<i>Atelopus spinulosus</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Rescue (CIAAV)	●	●	●	↔
<i>Craugastor buckleyi</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Rescue (CIAAV)	●	●	●	↔
<i>Gastrotheca orophylax</i>	Centro Jambatu de Investigación y Conservación de Anfibios	Luis A. Coloma	Rescue (Other)	●	●	●	↔

Thanks to our Amphibian Ark associates

In this newsletter we are pleased to feature another of our professional associates, who regularly offer their services to support our amphibian conservation work. These individuals have contributed many hundreds of hours of their time to share their expertise and help with workshop facilitation, instructing at training courses, and chairing advisory groups.

We very much appreciate the continued support of these individuals, and their respective institutions. For a list of our associates, please visit: www.amphibianark.org/associates/.

Associate Spotlight - Jamie Copsey, Managing Director, Durrell Conservation Training Ltd (Mauritius) and Head of Learning and Development at Durrell Wildlife Conservation Trust (Jersey)

Jamie is currently based in Mauritius where he is leading Durrell's initiative to establish its first permanent satellite training academy within one of Durrell's focal conservation regions, the Indian Ocean. Jamie is also responsible for the development of Durrell Conservation Academy, based in Jersey, British Channel Islands, which to date has trained more than 3,500 conservationists from 139 countries in the principles and practice of endangered species recovery. He graduated from Glasgow University in 1993 with a BSc (Hons) degree in Zoology and has since completed a Masters in Anthropology at University College, London and a Diploma in Management and Leadership with the Chartered Management Institute. He has field work experience in Mauritius, Seychelles, Trinidad and Madagascar and has worked for more than 20 years in the field of species conservation and capacity development. In addition to developing and delivering training programs, Jamie is a trained facilitator and helps a variety of organisations with their strategic planning needs. He has published on a range of topics including community conservation, invasive species management, animal nutrition and behaviour and amphibian conservation. Jamie is currently working on a book on island species conservation to be published through Cambridge University Press.



Jamie Copsey from Durrell Wildlife Conservation Trust with amphibian biologists in Sri Lanka. Photo: Jamie Copsey.

In 2006, and after the publication of the Amphibian Conservation Action Plan (ACAP), Jamie, Gerardo García, and his collaborators at Durrell Wildlife Conservation Trust became increasingly concerned regarding the state of amphibians, and began to discuss how they could use their collective expertise to assist amphibian conservation further. The organization has been involved in a range of amphibian conservation initiatives including work to conserve the Montserrat Mountain Chicken frog (*Leptodactylus fallax*) in the Caribbean and the Mallorcan Midwife Toad (*Alytes muletensis*). Jamie and colleagues decided they could capture that experience and that of a range of partner organisations to develop training programs to build capacity for amphibian conservation in some of the countries of greatest need. Their hope was that this would provide a catalyst for amphibian work, and equip biologists with the skills they need as practitioners to implement effective conservation. The courses developed focused on *ex* and *in situ* strategies for conservation, in addition to practical skills needed such as project management, leadership, and facilitation. In 2006, the first Amphibian Conservation course was conducted in Jersey attracting participants from around the world. One of the participants on this first course Arturo Muñoz, went on to establish the Bolivian Amphibian Initiative, providing the kernel of a conservation opportunity for the threatened amphibians of this high biodiversity country.

The Durrell team quickly found there was tremendous desire for more training overseas and went on to deliver tailored versions of the training course in India and Bolivia. In 2008, they developed their husbandry course, as zoos became more interested in becoming involved with amphibian conservation efforts. They brought that training overseas (with partners like Amphibian Ark) in Argentina and Sri Lanka. These courses combined species conservation prioritization for *ex situ* action with follow-up husbandry training, which resulted in the development of species management plans for some of the species highlighted for *ex situ* conservation action. In 2011, Jamie led the development of chytrid screening training in Madagascar resulting in the creation of a government-endorsed 'disease task force' charged with collating and responding to information on chytrid and its occurrence should it be detected on the island. A nation-wide amphibian chytrid screening program was also created, conducting annual screening of frogs in focal areas to pick up the disease as close to arrival as possible (Weldon et al, 2014). In 2012 Durrell partnered with the local community-based conservation organisation Association Mitsinjo, to deliver amphibian husbandry training for amphibian biologists from across Madagascar, including those from the University of Antananarivo and the Madagascar Fauna Group's Parc Ivoloïna, on the east coast. From there, links were made between these institutions so they could share experiences and partner locally on amphibian conservation projects.

Amphibian Ark is incredibly grateful for Jamie and Durrell for all that they do for amphibian conservation. "Jamie has a great rapport with students and is focused on going beyond the nuts and bolts of husbandry and breeding techniques in the lab to incorporate program planning, fundraising and more to create real conservation leaders and trainers." – Ron Gagliardo, AArk Training Associate.

Back in Jersey, Durrell has provided amphibian practitioners from all over the world the opportunity to come for internships in the Herpetology Department of Durrell Wildlife Park to shadow staff and learn valuable husbandry skills. As a part of this program, these interns also receive much needed seed funds for their own conservation work. Jamie has most recently been contributing to Durrell's wider Amphibian Conservation Plan which will see the organisation taking even more of a prominent role in amphibian conservation, research and training over the coming years.

Durrell Conservation Academy, in Jersey and in Mauritius offers a range of cross-disciplinary training courses designed to meet the growing needs of species conservation practitioners worldwide. To find out more go to www.durrell.org/academy or contact Jamie at jamie.copsey@durrell.org.

Building amphibian husbandry expertise: Keeper exchanges between Parc Ivoloïna and Association Mitsinjo

Devin Edmonds and Justin Claude Rakotoarisoa, Association Mitsinjo; Maya Moore and Bernard Lambana Richardson, Parc Ivoloïna; and Jeff Dawson, Durrell Wildlife Conservation Trust

The island of Madagascar supports a tremendous diversity of amphibian species, with four families, 25 genera and potentially upwards of 500 species, of which 100% of native species are endemic and many are yet to be described. They face a number of threats, most notably habitat loss, with only a fraction of the original natural forest remaining. The ongoing effects of climate change and over-collection for the food and pet trades are also likely taking a toll and the recent report that chytrid fungus was detected in amphibians exported from the country is a new potentially devastating threat. Immediate attention is therefore warranted to develop the infrastructure and personnel in Madagascar needed to enact *ex situ* conservation programs as an important component in safeguarding Madagascar's threatened amphibian species.

To this end, a breeding facility was developed in Andasibe, Aloatra-Mangoro region, east-central Madagascar in early 2011 through a collaborative effort between Association Mitsinjo, the Amphibian Specialist Group of Madagascar, and the Direction Générale des Forêts. To expand on the existing knowledge developed in Andasibe, an Amphibian Conservation Husbandry training course was held by EAZA institutions at Mitsinjo in November 2012, and included Malagasy participants from eight institutions, including Madagascar Flora and Fauna Group's Parc Ivoloïna, a zoo and forestry station located near the eastern coastal city of Toamasina.



Staff from Parc Zoologique Ivoloïna during a recent training session with Justin Claude Rakotoarisoa, Lead Amphibian Technician, from Association Mitsinjo in Madagascar.
Photo: Devin Edmonds.

Through funding secured as a result of this course, Parc Ivoloïna built a dedicated room for raising captive amphibians and live arthropod colonies so staff could begin practicing what they had learned. Construction was completed in October 2013 and since then their work has included culturing fruit flies, developing biosecurity protocols, and finally maintaining a captive group of the reed frog (*Heterixalus madagascariensis*). Two staff already well-versed in the captive husbandry of lemurs (of which the park maintains twelve species, as well as tortoises, chameleons, and boas) have now spent more than six months gaining hands-on experience with captive frogs and live foods in the newly renovated building.

To expand on this beginning, between May 4-7 2014 Durrell Wildlife Conservation Trust facilitated the first in a series of training exchanges between Association Mitsinjo and Parc Ivoloïna. The broader goal of these exchanges is for the specialized amphibian technicians at Mitsinjo to share their expertise with the team at Ivoloïna, working together to trade ideas, improve the park's newly developed facilities, and to begin building a national captive breeding network for the country.

During this first brief trip, we made a plan for the coming months which includes minor building renovations to improve infrastructure – including installation of an isolated quarantine area and developing a safer water supply – followed by a three-month period where keepers from Parc Ivoloïna work alongside technicians at Mitsinjo's facility and then Mitsinjo's staff stay at Ivoloïna. While at Ivoloïna, Mitsinjo staff will use a modified version of the training curriculum provided to them over the six-month period when the facility in Andasibe was being developed in 2010-2011; in this way becoming teachers of amphibian husbandry themselves, utilizing their three years plus experience gained maintaining captive populations in Andasibe.

We are hopeful that through these training exchanges, further capacity will be built in Madagascar to allow rapid *ex situ* action to take place for the unique and highly endemic amphibian fauna of the island. In this light, we are thrilled that Parc Ivoloïna is a recent recipient of a 2014 Amphibian Ark Seed Grant (see article on page 2). With these funds, coupled with support from Durrell, we see a bright future, with Parc Ivoloïna emerging as another location in-country where a captive assurance colony of a threatened species can be maintained to safeguard against extinction lest it be needed.

MAZURI® Exotic Animal Nutrition sponsors Amphibian Ark to join ISIS



Thanks to a recent and generous sponsorship from our friends at MAZURI Exotic Animal Nutrition (www.mazuri.com), Amphibian Ark recently joined the International Species Information System (ISIS, www.isis.org), providing us access to population-level amphibian data in the Zoological Information Management System (ZIMS), the global animal records database and software. MAZURI Exotic Animal Nutrition became an ISIS corporate partner earlier this year, and Dr. Liz Koutsos, Director of MAZURI Exotic Animal

Nutrition said "It gives us great satisfaction to join AArk on the front lines of the fight to save the world's imperilled amphibian populations by bringing together ISIS's information management application and AArk's conservation initiatives." This approach helps ISIS contribute back to the community and lend support to a key conservation initiative.

We also very much appreciate the cooperation from ISIS in allowing us to join as a conservation partner, and allowing us to access amphibian data, which will be beneficial to us for monitoring and helping manage captive populations of endangered amphibians.

MAZURI Exotic Animal Nutrition is a world leader in quality nutrition for virtually every living exotic animal. It designs, tests and produces more animal diets than any other company in the world. It also supports ongoing research and conservation through grants and sponsorships with other animal experts. Since 1989, zoo professionals, veterinarians, breeders and exotic pet owners have trusted their animals to MAZURI Exotic Animal Nutrition.

ZIMS is the largest database in the managed animal care community worldwide, and it includes detailed information on more than 3,000,000 animals and 15,000 species, putting ISIS and its members in a unique position to initiate programs in wildlife conservation, population sustainability and biodiversity. ISIS was founded in 1974 and currently has 840 member zoos, aquariums and related organizations in 84 countries.

Zoos, aquariums and other conservation organizations worldwide use the ZIMS application to track relevant information needed by their animal care staff, including collection management, husbandry, and health and disease history. ISIS members use this information to:

- manage their inventory
- control the genetic and demographic makeup of their animal collections
- find appropriate unrelated new animals
- identify institutions seeking animals
- discover facilities with experience in breeding and raising certain offspring
- create reports for governments and other official accrediting bodies.

On 28 April this year, ISIS launched ZIMS for Medical, which allows users to integrate medical information with animal inventory and husbandry records. This will provide a more comprehensive records system with a single point of access to wide assortment of animal care and collection management information.

For more information about ISIS and ZIMS, the leading global animal records management platform, please visit www.isis.org.



ISIS

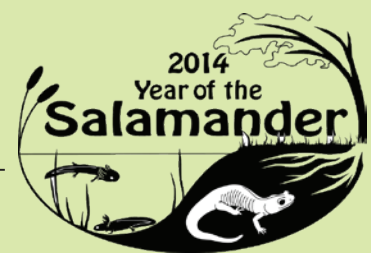


Enter the Year of the Salamander video contest!

Here's how you can participate!

Partners in Amphibian and Reptile Conservation and conservation groups from around the world have designated 2014 as the Year of the Salamander. Through this unprecedented partnership, organizations and individuals will work together to raise awareness of salamanders as well as scale up global salamander conservation, education and research efforts.

Here is your chance to get involved with the Year of the Salamander through a new video contest - the "Salamanders Matter" video campaign! We want you to make a video that will help raise awareness to the general public about salamanders around the world!



We're looking for videos that not only convey salamander conservation messages, but that also reflect your passion for these amazing species. They can be edited and polished videos, or rough cuts shot from your phone out in the field. Whether it is animation, live action, original songs or something completely different, be sure to tell your story in a clear and creative way. Be sure to also come up with a unique and creative name for your video entry.

The deadline for the Salamanders matter contest is: July 31, 2014. Download the PDF of the announcement for complete guidelines and contest from our web site, www.parcplace.org/images/stories/YOSal/2014_YOSal_SALAMANDERS_MATTER_Video_Campaign_1.pdf. If you have any questions, please email us at: yearofthesalamander@gmail.com.

Call for Photos for the 2014 Year of the Salamander Calendar Photo Contest

We are seeking close-up, digital photos of salamanders, preferably in their natural habitats or within an educational or conservation context. One winner will be selected each month to be the featured photo as part of the Year of the Salamander online calendar. Runner-up photos will also be included in the calendar. In addition, all submitted images will be considered for use in the Year of the Salamander monthly newsletter and website as well as other Year of the Salamander-related conservation, outreach, and educational efforts.

Give us your best shot!

For more information and for entry details, please visit www.parcplace.org/images/stories/YOSal/YOSphotocontest.pdf.

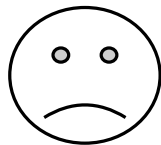


Winner: A Green Salamander (*Ambystoma opacum*), the only salamander species in North Carolina listed as endangered, suspiciously was the photographer as she guards her eggs. She will stay with the eggs until after they hatch in about 30 days and she will not feed during that period. Alan Cameron took this wonderful picture at Trout Run Recreational Forest, North Carolina. Remember - don't just spot, track or disturb other fragile microhabitats to view or photograph salamanders.

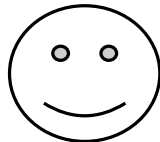
2014 Year of the Salamander							
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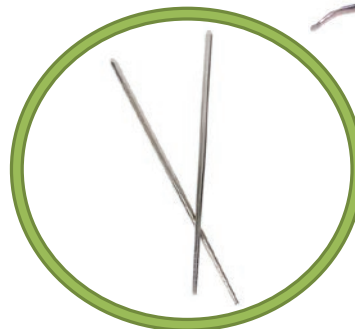
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Salamander photos
courtesy of
Brian Gratwicke

Montseny Brook Newt *ex situ* conservation program

Francesc Carbonell, Monica Alonso, Raquel Larios, Elena Obon and Emili Valbuena-Ureña, Centre de Fauna Salvatge de Torreferrussa (Catalan Wildlife Service- Forestal Catalana, SA), Spain; and Fèlix Amat, Àrea d'Herpetologia, Museu de Granollers-Ciències Naturals, Spain

The Montseny is a mountain range only 60 km away from one of the most popular cities of the world, Barcelona, in Spain. Although the Montseny range had been subjected to many scientific studies and is one of the most popular places for weekend vacations for Barcelona residents, no one could have imagined that is home of the most endangered amphibian in western Europe, the Montseny Brook Newt (*Calotriton arnoldi*). Populations of stream-dwelling newts were found initially in 1980 and obtained species status in 2005, after many years of study. At that time, the scarcity of populations of the species worryingly suggested that the Montseny Brook Newt could be a severely endangered species. So, from 2007 to now, we have launched an ambitious program to assess the conservation status of the species, investigating its biology and implementing management strategies including an *ex situ* conservation program.



Juvenile Montseny Brook Newts (*Calotriton arnoldi*).
Photo: Francesc Carbonell.

triton asper), but a crucial difference exists; Montseny Brook Newts never leave the aquatic habitats of the streams whereas immature animals of many populations of the Pyrenean species have a terrestrial dispersal phase. The activity is nocturnal and most of the newts are hidden in the rocky matrix of the stream bed. Newts of both sexes mature at three years and can live up to nine years.

Taking into account the small species range and the results of analyses based on mitochondrial DNA, nuclear genes and microsatellites, the Montseny Brook Newt exhibits a high level of population structuring, coinciding with the split of the species' range into the two subpopulations. The species shows low effective population size estimated by microsatellites by each subpopulation, indicating a dramatic high risk of population extinction. In addition, it has a strong phylopatry without exchange of genes between the populations.

In 2007 we launched a captive program, and the main goals of this program were the foundation of a genetic reservoir and the evaluation of the success of captive reproduction as conservation strategy for the establishment of new populations near the existing ones.



Captive breeding facilities for the Montseny Brook Newt at the Torreferrussa Wildlife Rehabilitation Center in Spain. Between 2010-2014, 532 captive-bred newts have been released, with some being recaptured during subsequent field studies, and reproduction attempts observed. Photo: Francesc Carbonell.

The Montseny Brook Newt is critically selective in terms of habitat, living in fast-flowing and steep streams formed by cascades and pools, surrounded by well-structured forests of beeches and oaks. After surveying most of the Montseny mountains, the species has only been found in a very restricted area of less of 8 km² and the total lineal extend of the species' range is less than 5.8 km of streams. The population is divided into two isolated subpopulations made up of four and three streams respectively, and the total estimated adult population is less than 1,500 individuals.

The main threats to the species persistence are affects to the hydroperiod stability and the quality of forest along the streams. Moreover, climatic change has been producing an altitudinal change of the beech and oak forest during the last 50 years. Although the population is considered generally stable, the disappearance of the species in a stretch of stream has been confirmed.

Most aspects of the life-history of this newt are roughly similar to its related species, the Pyrenean Brook Salamander (*Calotriton asper*), but a crucial difference exists; Montseny Brook Newts never leave the aquatic habitats of the streams whereas immature animals of many populations of the Pyrenean species have a terrestrial dispersal phase. The activity is nocturnal and most of the newts are hidden in the rocky matrix of the stream bed. Newts of both sexes mature at three years and can live up to nine years.

Torreferrussa Wildlife Centre, 30 km away from the Montseny range, is run by the Catalanian government. The centre is divided into two areas, a wildlife rehabilitation area with an annual case load of 5,000 wild animals and the captive breeding area which has been dedicated for decades to captive breeding programs for different species of threatened birds of prey.

All facilities for the captive breeding of the Montseny Brook Newt were newly constructed. Priorities in these facilities are the design of the aquariums to maximize appropriate water quality and easy maintenance. Breeding facilities for each subpopulation are independent. The initial program was created using six and five pairs of animals for each subpopulation respectively, while the final results in the genetics analysis of the structure for the wild population were pending. Now the genetics structure of the population is well known, and new founders will be incorporated to obtain a minimum of twenty founders for each subpopulation.

Reproduction has been successful since the first year in the program. Breeding protocols have been

elaborated and better results were been obtained in later years. Studbook management software is used for the maintenance of genetic variance of the captive population, and the fecundity of pairs has been very unequal and recent exchanges of pairs were made to improve the productivity of underrepresented individuals. From 2007 to 2013 we raised 1,205 larvae, but more importantly, in 2013 the first generation bred in captivity successfully reproduced for the first time.

Currently, two new captive reproduction centers have been incorporated into the *ex situ* program, Barcelona Zoo and the Wildlife Recovery Center of Pont de Suert. Each center will maintain individuals from only one of the subpopulations. These two new centers have an additional positive advantage - they are able to raise awareness about the threats faced by Montseny Brook Newts with the general public, since they receive thousands of visitors each year.

We started a pilot/experimental program to establish new populations by introducing developed larvae and immature animals which were captive-bred into new streams. There are more than 7,200 m of streams in Montseny with potential habitat for the species, apart from their known range. We selected two streams within the potential species range, each one close to a given subpopulation. Between 2010–2014 we released a total of 532 newts (390 from one population and 142 from the other). During subsequent field surveys we have recaptured some of the introduced newts, although the cryptic behavior of larvae and immature animals makes it difficult to accurately assess the success of the new populations. We will need to wait for several years to fully evaluate the success of these reintroductions. We also observed reproduction attempts in the new populations.

This is a coordinated program being undertaken by the Servei de Biodiversitat, del Departament Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural (DAAM), Generalitat de Catalunya, the Parc Natural i Reserva de la Biosfera del Montseny (Diputació de Barcelona, Diputació de Girona), Museu de Granollers-Ciències Naturals and the Zoo de Barcelona.

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A pair of Montseny Brook Newts in amplexus. Mating takes place all the year with this species. Photo: Francesc Carbonell.

Amphibian Ark “Advance”

In late May Amphibian Ark staff were joined by previous staff members, representatives from the Amphibian Survival Alliance (ASA), representatives from CBSG, and other amphibian experts for a three-day Strategic Action Planning workshop hosted by Zoo Atlanta. During the workshop AArk’s vision: **The world’s amphibians safe in nature** was reaffirmed, and AArk’s mission was revised slightly to: **Ensuring the survival and diversity of amphibian species focusing on those that cannot currently be safe-guarded in their natural environments**.

Dr. George Rabb reviewed the history of the amphibian crisis, first recognized in 1989. Under the leadership of the SSC, the Declining Amphibian Populations Task Force (DAPTF) was formed in 1990; and in 1997 in conjunction with Chicago Zoological Society convened amphibian experts from around the world at a conference that pinpointed the chytrid fungal agent *Bd* as responsible for enormous population declines and in some cases extinctions. Concerns over the devastating impact of chytrid led to the formation of the Amphibian Ark in 2006 and the Amphibian Survival Alliance in 2011. Dr. Rabb noted that in spite of a substantial effort over the past 25 years, we still have a long way to go in addressing the amphibian crisis.

Presentations on the work of the ASA, AArk and the current state of research on probiotics laid the groundwork for the development of a three-year Strategic Action Plan for AArk. Top priority goals include: developing more well-planned and realistic programs that articulate plans from initial inception of captive programs to secure wild populations; catalyzing new assurance colonies while ensuring that existing programs are monitored and evaluated; and expanding our connections with partners.

The workshop was an important step in developing AArk’s future direction as was participation from ASA and other partners.



Research and conservation efforts with Costa Rican salamanders

Brian Kubicki, Director, Costa Rican Amphibian Research Center

Costa Rica is famous for its outstanding biological diversity and pioneering methods of natural resource protection. Amphibians make up an important part of this impressive biodiversity, with 200 species having been documented from within the tiny 51,032 km² national territory, including three genera and 49 species of salamanders.

During the last 12 years, the Costa Rican Amphibian Research Center (CRARC) has been conducting pioneering work into the biological research and conservation of Costa Rica's amphibians. Recently more efforts have been directed by the CRARC on attempting to better understand and document some of the poorly known taxa of Costa Rican salamanders, many of which are endemic. The research is aimed at clarifying species-level taxonomy, distributions, and improving the understanding of the general natural history of certain Costa Rican salamanders.



Brian Kubicki from the Costa Rican Amphibian Research Center (CRARC), searching for moss salamanders. Research at CRARC is aimed at clarifying species-level taxonomy, distributions, and improving the understanding of the general natural history of certain Costa Rican salamanders. Photo: Brian Kubicki.



Nototriton abscondens, one of the local moss salamander species being researched by the Costa Rican Amphibian Research Center. Photo: Brian Kubicki.

In 2013 the CRARC was awarded \$4,700 through an Amphibian Ark Seed Grant for a project focused principally on one of the most poorly understood groups of Costa Rican amphibians, the enigmatic and miniature moss salamanders of the genus *Nototriton*. Costa Rica has eight species of moss salamanders, all of which are endemic and known from very restricted ranges. Since 2012 Brian Kubicki and Aura Reyes of the CRARC have invested hundreds of hours working with all eight species of *Nototriton* at numerous sites throughout Costa Rica in order to take a closer look at aspects of their taxonomy, natural history, and distributions. Most of the field sites where the CRARC has been working with moss salamanders have been newly discovered during this study, and these new sites have extended the known ranges of most species. Prior to the efforts of the CRARC, two species of Costa Rican *Nototriton* were only known from the single holotype specimen (i.e. *Nototriton major* and *Nototriton tapanti*), but Brian and Aura have found both species at several new sites. Numerous other important discoveries have been made during the field studies that will give us a better understanding of the natural history of these secretive little salamanders.

In addition to studying moss salamanders in their natural environment, the CRARC has also been developing novel methods for maintaining these diminutive amphibians in captivity. Very little work has been dedicated to exploring the captive husbandry techniques surrounding most of the nearly 280 Neotropical salamander species, and Costa Rican moss salamanders are no exception. The captive husbandry efforts by the CRARC mark the first for Costa Rican moss salamanders. A section of the CRARC lab has been dedicated to experimenting and defining parameters and methods to maintain and hopefully eventually reproduce moss salamanders in captivity. Captive husbandry management presents a great opportunity to better understand the biology of these tiny salamanders by allowing controlled observations that are difficult to achieve in the natural habitat. In addition to captivity allowing us to obtain a better understanding of the biology of Neotropical salamanders, the knowledge obtained through captive maintenance might lead to the correct actions regarding *in situ* and *ex situ* conservation methods of Neotropical salamanders if needed in the future.

Despite having a large diversity of salamander species native to Costa Rica, most of them remain very poorly understood in terms of their taxonomy, distributions, natural history, and conservational needs. The future plans of the CRARC are to continue conducting *in situ* and *ex situ* studies on not only Costa Rican moss salamanders, but additional species of *Bolitoglossa* and *Oedipina*, which are the two other genera of salamanders native to Costa Rica.

Hellbender T-shirt contest

David Hedrick, Lead Ectotherm Keeper, Chattanooga Zoo, Tennessee, USA

At Chattanooga Zoo, we have been working with Hellbenders (*Cryptobranchus alleganiensis*), both *in situ* and *ex situ*, since 2009. During that time, we have sold Hellbender T-shirts to raise funds for field research in Tennessee. We were feeling like it was time for a new shirt design, and decided to involve our friends in the design and selection process through Facebook, via a T-shirt design contest! So we announced the contest on our Facebook page, and it travelled the world! We put out a deadline and allowed six weeks for people to work on their designs.

Every week or so, we posted a reminder on Facebook, with an educational piece to go along with it. This helped keep people involved, returning to our page, and most importantly, learning about the species. We talked about paternal care and how much time a Hellbender dad can dedicate to his young, shared a great photo by Joel Sartore and links to his Photo Ark project, and talked about our Hellbender Conservation Partnership with Mohawk Canoes.

Once the T-shirt design deadline was up, we posted six designs for people to vote for with a "like". The artists were notified by email so they could drum up votes for their designs. Again, this was great for bringing people to the zoo's Facebook page and helping them learn about the plight of this nearly forgotten giant salamander.

Our Facebook friends selected a winner, Bob Britt, a Chattanooga local! The T-shirts will be printed soon and will enjoy wider distribution than before, thanks to Mohawk Canoes, Waldens Ridge Whitewater, and some other regional outfitters!

This was a really fun little undertaking and gave people a chance to directly affect a project, learn, and have a positive impact for several years, until we do it again!



The winning design in Chattanooga Zoo's Hellbender T-shirt design contest. Photo: Chattanooga Zoo.



A fantastic photo of a Hellbender by Joel Sartore was used to raise awareness about the species, along with a link to the Photo Ark project. Photo: Joel Sartore.

Hellbenders Humans Habitat!

The past couple of generations have lost the knowledge of the existence of North America's giant salamander...They can still be found in a few pristine locations, mysterious, ancient denizens of our rivers and streams...sharing habitat with humans! River recreationalists almost as wild as themselves. Throughout their range, Hellbenders and paddlers live in and on many of the same streams, and both require clean, clear waterways to survive. This shared interest brings together Chattanooga Zoo and Mohawk Canoes, a canoe manufacturer based in Chattanooga.

Mohawk Canoes supports the Zoo's Hellbender project in the field and in educational outreach. We want to teach everyone about this amazing creature, this pre-historic amphibian, which inhabits these very same streams we all love so much.



Workshop on amphibian veterinary care in Peru

Amphibian Ark was invited to the XXI Annual Congress of the Latin-American Zoos and Aquariums Association held in the Parques Las Leyendas in Lima, Peru from April 28th to May 2nd to conduct a mini-workshop on amphibian veterinary care. Amphibian Ark's training officer, Dr. Luis Carrillo and Dr. Roberto Elías from the Denver Zoo were the organizers and instructors during this mini-course.



Amphibian Ark's training officer, Dr. Luis Carrillo giving a presentation on amphibian veterinary care during the XXI Annual Congress of the Latin-American Zoos and Aquariums Association. Photo: Luis Carrillo.

The course was organized in two sections, the first including lectures on anatomy and physiology, common amphibian diseases and necropsy techniques. The second part was a hands-on laboratory which include necropsy practical, physical examination and exploration.

Twenty veterinary and veterinary students from four Latin-American countries participated in this mini course. We hope that this information aroused the interest of the participants in amphibian medicine.

National Amphibian Expo

The National Amphibian Expo (NAE) is a biennial event with a primary focus on advancing scientific understanding and promoting innovative captive husbandry standards for tropical and temperate amphibian species. This year, the event will be held at the Butler University, Indianapolis, Indiana, USA, on Saturday August 9th, and all proceeds from vendor table sales and a silent auction will benefit Amphibian Ark. The expo will feature professionals and hobbyists alike discussing and sharing knowledge and experience and will foster innovation in captive breeding and captive husbandry of amphibians.

AArk staff are very excited to be partnering with the NAE Committee, and in line with this year's conservation theme of "Support Local. Support Global", we have chosen to contribute all of the funds raised for the AArk to support two amphibian projects - one locally (in the US) and one globally (in Madagascar).

Locally, we've chosen a research and recovery project for Crawfish Frogs (*Lithobates areolatus*), run by Dr. Michael Lannoo from the Indiana University School of Medicine, and three of his students, Rochelle Stiles, Andrew Hoffman and Jonathan Swan from the Indiana State University. Crawfish Frogs spend much of their adult life in crayfish burrows, and are associated with tallgrass prairies or other native grasslands, however, these habitats are increasingly being fragmented by, or converted to, row-crop agriculture. Local and regional declines may be further enhanced by interactions with exotic species and the emergence of infectious diseases. The project involves monitoring Crawfish Frog populations in Indiana and regionally, to determine their status; define natural history features; determine the genetic relationships between different populations; define the role of disease (specifically, chytrid fungus); and determine how practical captive rearing can be for augmenting wild populations. The team will also provide management recommendations to the Indiana Department of Natural Resources and the US Fish & Wildlife Service to maximize the likelihood that Crawfish Frog populations persist in Indiana. In 2013, the team entered into a partnership with the Detroit Zoological Society to hatch wild-caught Crawfish Frog eggs and raise tadpoles to pre-metamorphic stages.



Swabbing Golden Mantellas at the Association Mitsinjo amphibian facility.
Photo: Devin Edmonds.



Captive-bred Golden Mantella frogs (*Mantella aurantiaca*) will be used for reintroductions at restored breeding sites near the amphibian breeding facility in Andasibe, Madagascar. Photo: Sidonie Samina Sam.

The "global" project that will receive the second half of the funds raised at the NAE is the amphibian captive breeding facility at Association Mitsinjo, a community-run organization founded by villagers in Andasibe, Madagascar, under the guidance of Devin Edmonds, Amphibian Conservation Director. This facility was awarded an AArk Seed Grant in 2009, and it now maintains captive amphibian populations to help ensure the continued survival of species at the greatest risk of extinction. Initially, two common frog species, *Boophis pyrrhus* and *Mantidactylus betsileanus* were bred at the facility and the resulting tadpoles were used to study the optimal husbandry requirements for the larvae of these species, which can be applied to maintaining threatened frog species of similar ecological guilds should the need arise in the future. In 2012, a captive assurance population of one of Madagascar's most threatened amphibian species, the Golden Mantella (*Mantella aurantiaca*), was established at the facility. The frogs are maintained by a team of eight Mitsinjo technicians, including lead technician, Justin Claude Rakotoarisoa, who was awarded the Zoo Med Amphibian Academy Scholarship in 2013, allowing him to attend the Amphibian Academy in Toldeo, USA.

AArk staff, and the researchers and amphibian conservationists involved with these two projects are very grateful for the support of the National Amphibian Expo, and we look forward to providing updates on the continued progress of these two important amphibian programs.

And don't forget, the National Amphibian Expo will be held at the Butler University, Indianapolis, Indiana, USA, on Saturday August 9th. More information available on the NAE web page, www.naexpo.org.



Crawfish Frog (*Lithobates areolatus*) tadpoles were captive-reared in 100 gallon cattle troughs at the Detroit Zoo.
Photo: Michael Lannoo.



Captive-reared Crawfish Frog tadpoles were released at Gosner Stage 39 into a mesh enclosure at Hillenbrand Fish and Wildlife Area West in Greene County, Indiana. Photo: Michael Lannoo.



Sustainability in vereda

Izabela Menezes Barata, Instituto Biotrópicos, Brazil

A monitoring program in Brazil is investigating amphibian communities and is empowering people with knowledge.

The Brazilian Cerrado is a biodiversity-rich biome in Brazil, which is threatened by agriculture, livestock farming and fire. In this tropical biome, weather is defined by wet and dry seasons and the temperature average is 25°C. The savannah-like formations are characteristic, with large open grass fields surrounded by more closed canopy formations.

The vereda – a typical vegetation formation which occurs in the Brazilian Cerrado – is a swamp dominated by the Buruti Palm Tree (*Mauritia flexuosa*). Vereda is also the name of a local and endemic toad species (*Rhinella veredas*), and the name of a national park protecting 230,000 hectares of Cerrado hinterlands and a portion of the Carinhanha River. This region is considered a priority area for herpetofauna and biodiversity conservation, and needs special investigation.

Researching amphibians in the Cerrado biome is mostly restricted to a short survey window during the rainy season. Species are generally calling from 6 pm to 12 am and are easily detected on lakes, rivers, ponds and swamps. In south-eastern Brazil, the Carinhanha River contributes to a unique ecosystem – the riverside lakes – formed by multiple-sized lakes nestled along the river, which are seasonally flooded when the river water level overflows to adjacent lakes. Since 2012 we have been investigat-

The vereda is a swamp dominated by the Buruti Palm Tree (*Mauritia flexuosa*), and is a typical vegetation formation which occurs in the Brazilian Cerrado. Photo: Guilherme Ferreira.

ing amphibian communities in this ecosystem. We started the project by designing a monitoring protocol based on simulations with occupancy analysis. We are now implementing the protocol, which consists of repeated visits to a large number of sites. Species are sampled using vocal records, and therefore we spend only a few minutes at each site. The overall goal of the project is to assess trends on populations of anurans (frogs and toads) which inhabit riverside lakes, and compare changes over time.

Riverside lakes differ in size, temporality, vegetation type, use by cattle, ownership (private/public land), and protection (inside or outside legally protected areas). We are also collecting data on climatic variables, such as humidity, temperature and precipitation. Since many sites are inside private land, we wanted to include land-owners in our monitoring program. We provided each one with a handbook including pictures of amphibians occurring in the Cerrado biome and the Carinhanha River. Some species were photographed at the land-owners' own property, and they really appreciated seeing these photos in a high quality publication. Land-owners are now participating in the program by sampling local climatic data. Every day, during the rainy season, they record the maximum and minimum temperatures, humidity and precipitation, and these data will be analyzed in the occupancy models.





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Private land holders in the Brazilian Cerrado are using voice recorders to record frog calls on their property. The overall goal of the project is to assess trends on populations of anurans which inhabit riverside lakes, and compare changes over time. Photo: Guilherme Ferreira.

For the first time in Brazil, some sites are being sampled using data loggers. The next step is to provide them with special training to use the data loggers, so they can install them around their own riverside and lakes. We plan to offer this training in July and the land-owners will hopefully start monitoring amphibians in October. This action will not only reduce the monitoring costs but also empower people with knowledge and help them to become citizen scientists. So far we only have three data loggers, which reduces the number of land-owners that can participate of this activity. This equipment is not available in Brazil, and we are in need of financial support to help us acquire them. For more information on our needs, please see our entry in the Frog MatchMaker list, <http://aark.portal.isis.org/Amphibian%20Partnerships/Lists/Amphiban%20partnershis/DispForm.aspx?ID=59>.

Students are also participating in this project, and in fact children voted for the name of our mascot, which is a tribute to the vereda's endemic toad. Lectures, movie sessions, art contest, and photography exhibitions are planned to be held at local schools. These activities were previously suggested by local teachers during a workshop and they focus on local problems faced by these communities: solid waste, biodiversity loss, habitat degradation and lack of knowledge. These activities will take place during the next school semester.

People who live at the Carinhanha banks suffer with very little government assistance and low human development. To improve their quality of life, we are implementing low-cost technologies that take advantage of the abundant sunlight to cook and heat water. Solar cooking reduces firewood use, while the water heater utilizes the recyclable waste. Both technologies reduce domestic costs of gas and electricity, helping families to save money. In a region with low electricity availability, people can start taking hot baths at night. Solar cooking workshops will be held during the coming months.



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Land holders are also becoming citizen scientists, by recording maximum and minimum daily temperatures, and by sampling other climatic data. Photo: Isabela Lazarotti.

Our research is important to overcome an information gap about amphibians in the Brazilian Cerrado. Long-term monitoring protocols can inform policy makers about the state of nature and drive future conservation planning. We are also building capacity, improving people's knowledge and helping them to become citizen scientists. Community outreach is extremely necessary for people to understand the importance of a research project, biodiversity maintenance, and ecosystem services.

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